

# Evaluation of E-learning Effectiveness in Culture and Arts Promotion: the Case of Cultural Division in Taiwan

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**Abstract**—In recent years, with the vigorous development of information and communication technology, industrial, governmental, academic circles lay more emphasis upon and invest more in the E-learning research and its application. The E-learning has already taken shape in its technological development and organizational operation, which is bringing greater added value to itself. However, failures should not be neglected. Three correlative problems come up urgently, namely, evaluation of the E-learning effectiveness, plan management, test, and efficient resources distribution. Through the present research, I propose that the governmental E-learning website effectiveness evaluation should be basically arranged on four levels, which are public policies, training plan, curricula, and technological design. Evaluation tools like policy indicators, four-level pattern, and ROI (return of investment) also ought to be associated as references in order to construct an integrated E-learning evaluation frame. The object of the present research is Cultural Affairs, School of E-learning, Executive Yuan. The findings are not only appropriate to the evaluation of governmental website E-learning effectiveness but also conducive to evaluation of the same type for enterprises and academic establishments or even other organisms.

**Keywords:** *E-learning; Profit Evaluation; ROI*

## I. INTRODUCTION

The information and communication technology has been vigorously developing since the end of the 20th century. In developed countries, all kinds of organizations, from governments and academic establishments to enterprises, have been investing a large number of resources in the research on learning, teaching and training programs with the aim to prepare and improve their competitiveness for a century of advanced knowledge or the 21st century. Most experts and scholars optimistically believed that this vogue of information technology and education development would deeply change human learning activities, and that, concurrent with the lifelong learning and the knowledge economy, it was sure to bring about a brand-new learning and training pattern.

Unfortunately, against their great conception, it was not rare that the efforts made by industries, governments and academic establishments ended in failure. One of such failures was the *Fathom.Com*, a commercial teaching program launched by Columbia University of the U.S.A. And more and more failures threaten to eclipse the numerous advantages taken on by E-learning and its technological and organizational feasibility. Thus, people are commencing on the reflection upon the E-learning affectivity and its evaluation.

Recently our Government is promoting National Science and Technology Program for E-learning. The ministries and

councils also construct their E-learning websites and develop corresponding systems, platforms, and coursewares for educational training as well as for public service. These E-learning sites are not purely commercial or profitable and the cost is extremely high. Under these circumstances, the problem of their effectiveness evaluation and durable running is sure to become the focus of attention among legislators, administrators, enterprises, and citizens. That is also the subject of the present research.

Ordinary enterprises adopt the Donald Kirkpatrick pattern to evaluate the E-learning effectiveness [4]. However, governmental policies are different from commercial enterprises and economic indicators are not their only measuring tools. Through the present research, we propose that, according to the roles played by different participants, the evaluation of governmental E-learning website effectiveness should be basically arranged on four levels, which are public policies, training plan, curricula, and technological design. On the first level, the E-learning belongs to the category of public policies. The American scholar of public policies Duncan MacRae does think that the indicators for the evaluation of government efficiency should be represented by these three “end values”: net economic benefit, subjective well-being, and equity [1]. So when we talk about the effectiveness of governmental E-learning websites, we should first and foremost be aware whether those three end values have been attained.

But those end values are not all and they are becoming less and less convincing because the situation is no more what it was. In recent years, the vogue is the notion of “entrepreneurial government”. According to this notion, public functionaries should serve as public entrepreneurs and do everything possible to amplify the government’s resources [1]. Thus, in respect of the plan management, the efficiency & effectiveness of the use that they make of those resources are also important connotations. In this sense, the government may, as enterprises do, adopt the Donald Kirkpatrick pattern and establish its own measuring tools. In respect of curriculum and courseware designs, learners’ experiences of and reactions on E-learning are the focus of attention to teachers and technicians, since E-learning involves naturally many creative teaching activities and software development.

In the present research we take the Cultural Affairs, School of E-learning as an example and we integrate the above factors such as the Duncan MacRae policy indicators, the Donald Kirkpatrick pattern, and the ROI index to seek an appropriate evaluation mode of governmental E-learning sites. At the same time, we also try to analyze the cost structure and

the profitability to which we can refer in our budget distribution, our cost control and the following added-value application. Our findings may help in the check and amendment of the annual plan. They can also serve as references for concerned evaluation of other kinds of E-learning websites.

## II. LITERATURE REVIEWS

E-learning is a term that means something different to almost everyone who uses it. Some use it to refer to pack-aged content pieces and others to technical infrastructures. Some think only of asynchronous self-study while others think E-learning can encompass synchronous learning and collaboration. Almost all agree that E-learning is of strategic importance.

E-learning is typically defined as learning using a computer and the Internet. Synonyms and/or related terms include learning that is: online, virtual, web-based, technology-assisted, distributed, open and distributed learning, and tele-learning. Related terms include distributed learning, computer-assisted learning, distance education, blended learning, computer-managed learning, learning management systems, and others.

Therefore, what is the exactly meaning for E-learning? NCSA (the National Center for Supercomputing Applications) E-learning group provided a general definition: "E-learning is the acquisition and use of knowledge distributed and facilitated primarily by electronic means. This form of learning currently depends on networks and computers but will likely evolve into systems consisting of a variety of channels (e.g., wireless, satellite), and technologies (e.g., cellular phones, PDA's) as they are developed and adopted. E-learning can take the form of courses as well as modules and smaller learning objects. E-learning may incorporate synchronous or asynchronous access and may be distributed geographically with varied limits of time." [4].

Rosenberg says, "E-learning refers to the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance. It is based on three fundamental criteria:

- E-learning is networked, which makes it capable of instant updating, storage / retrieval, distribution and sharing of instruction or information.
- It is delivered to the end user via a computer using a standard internet technology.
- It focuses on the broadest view of learning-learning solutions that go beyond the traditional paradigms of training." [3].

In Taiwan, due to the "E-learning Park" of "the National Science and Technology Program for E-learning" promoted by the National Science Council, Executive Yuan. Those programs have been using "E-learning" as the program formal definition. Therefore, this research used the same definition.

### A. The Development of E-learning

E-learning present four advantages: low cost of teaching and training, elevation of learners' interest, association of knowledge learning and new know-how, and more interactive channels and more flexibility. [2] In view of them, in developed countries, establishments such as governments,

schools, and enterprises all allocate funds and resources to encourage research in learning and educational training. In Europe, the Commission of the European Communities announced the guideline of E-learning policy "The E-learning Action Plan-Designing tomorrow's education" in 2001. [5] In 2002, The Secretary of Commerce in the United States addressed "2020 Visions-Transforming Education and Training through Advanced Technologies" report. The report was written by experts and scholars from Microsoft, HP, Harvard University, U.C. Berkley, Carnegie Mellon University, etc [6]. Within this framework, our Executive Yuan passed the National Science and Technology Program for E-learning and decided to allocate four billion NTD to promote this project in the five following years. In the "Challenge 2008: National Development Plan" conceived by the Council for Economic Planning and Development, this National Science and Technology Program for E-learning is in the first part of the "E-life initiative" which is in its turn a part of the "E-Taiwan Program".

Against that great conception, it was not rare that efforts made by industries, governments and academic establishments ended in failure. One of such failures was the *Fathom.Com*, a commercial teaching program in which Columbia University invested 30 million US dollars. The collaboration with world-famous establishments like the University of Michigan, the University of Chicago, the Cambridge University Press, the London School of Economics and Political Science and the British Museum in curricula and fund was not able to save *Fathom* from the elimination system of the market. In 2003, Columbia University decided to stop the investment program after four years of running [7]. (The *Fathom.Com* is still running and exploring new patterns.) Due to a large number of unsuccessful cases and cost augmentation, many people have begun the reflection on the effectiveness evaluation.

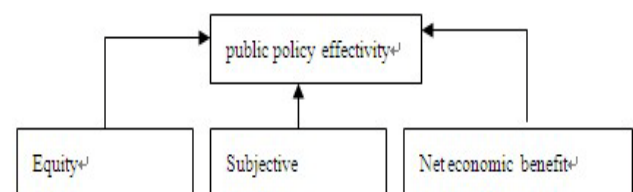


Fig. 1 Frame of policy indicators of MacRae

### B. The Effectiveness Evaluation of Public Policies

The object of the present research is governmental E-learning website. Thus, before discussing the problem of the concerned effectiveness evaluation, we should outline a systematical frame suitable to the effectiveness of government policies. The "Duncan MacRae policy indicators" (Fig. 1) may be a credible frame. According to the definition of Duncan MacRae, policy indicators are public statistic values, which can be adopted as tools of public policy evaluation. Policy indicators include three end values, namely net economic benefit, subjective well-being and equity. What can be calculated in money is in general the net economic benefit. Its most typical example is the cost-to-benefit ratio of a given policy. The subjective well-being consists in the people's (or some concerned people's) satisfaction or pleasure with a given policy. In other words, the economic well-being lies with the market value while the subjective well-being is a feeling. The third end value is the distributional equity, which is not the total integration of social well-being but the distribution of social well-being [1].

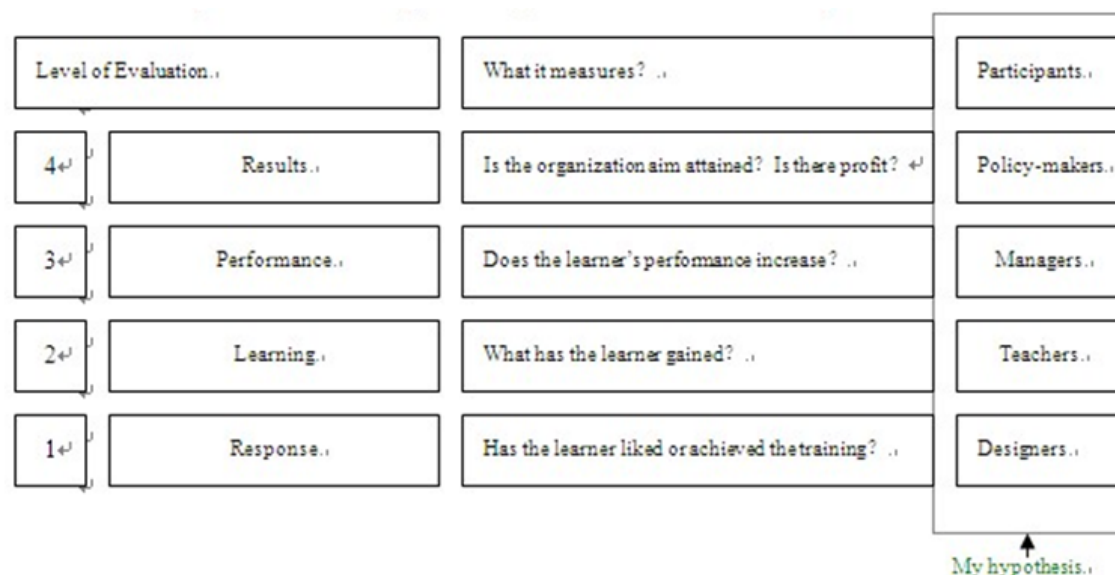
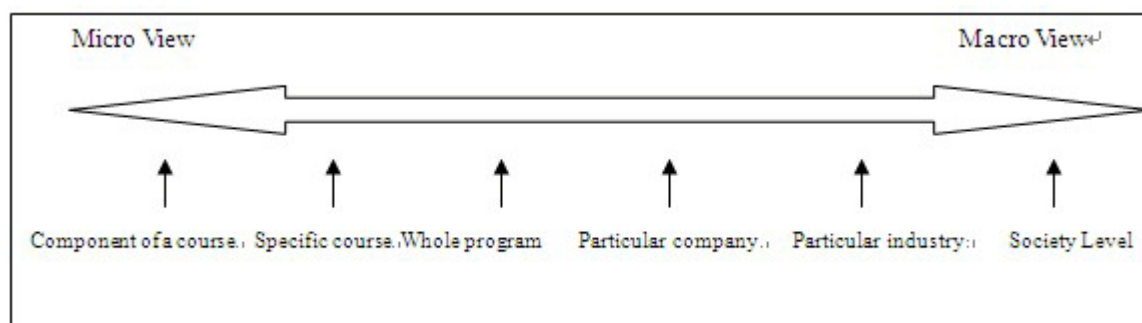


Fig. 2 Kirkpatrick pattern amended

Fig. 3 Spectrum of evaluation perspective (Source: William Horton, *Evaluating E-learning*, p7)

### C. Donald Kirkpatrick's Four-level Evaluation Pattern

Hence on the subject of the policy, we can evaluate the effectiveness of governmental E-learning websites with the above frame of policy indicators, which include net economic benefit, subjective well-being, and equity. The economic four-level pattern proposed by Donald Kirkpatrick in 1959 is used to evaluate the concrete teaching and training effectiveness in more details. The four levels are as follows:

(1) What is the reaction of the learner; (2) Has the learner get the knowledge or technique he or she wants to learn; (3) Can the learner apply what he or she has learned to his work; (4) Does the training achievement exert a positive influence upon the organization.

The first level, the reaction evaluation, is a regular method most organizations adopt to know about the learner's feeling for the courses such as whether he or she likes them and whether they are practical. At the end of the training, the training organization will distribute questionnaires for an inquiry. The second level consists in seeing whether the learner has got what he or she wants to learn and whether he or she has attained the level he or she wants to attain. The best method is to test and do some practical operations. The third level is the performance. The ultimate goal of the training is the improvement of the learner's ability to apply what has learned in practical workplace. The evaluation of this level requires collaboration and observation of directors and colleagues. The last level is the balance evaluation.

Economically speaking, the last profit should be larger than the initial cost. Thus, it is indispensable to check whether the output value and the profit of the organization are increased [3]. In the present research, we will try the above mode as the measuring tool for the governmental E-learning websites. However, the governmental training is divided into two parts according to its program's nature and aim: public functionaries and ordinary citizens. In this respect, we should allow for the different training aims and items of each group.

Another point of view we propose through this research is that, while the main participants of the E-learning organization include designers of the teaching materials, teachers, managers and policy-makers, we should, on the basis of Kirkpatrick pattern, make different evaluations according to their different roles and foci of attention. E-learning developers (instructional designers, simulation and virtual environment engineers, software engineers) [6] may face to problems like media design and technological application. One of the characteristics of the E-learning is that the teaching materials are implicated by the integration of components like writings, graphics, cartoons, films, and sounds. The same materials, by grace of different software, can be supported by Internet, CD-title, mobile phone, PDA, etc. The production of different components requires different engineers, different technologies, different equipments, different costs, and different time. The learner's media effectiveness and response to each component are all in the focus of attention of the designers and developers. As to gifted

lecturers & experts and teachers & tutors, their attention is focused on effective course designs and learners' achievement. Managers and administrators are concerned with the program's achievement. CEO or policy makers insist on the whole training achievement and profitability. Hence we think it necessary to amend the Kirkpatrick pattern, as shown in Fig. 2.

#### D. Horton's Spectrum of Evaluation Perspectives

According to different levels and aims, an evaluation can be carried out in different perspectives ranging from micro views to macro views. A spectrum of these views was elaborated by Horton [8], as shown in Fig. 3:

#### E. ROI

Enterprises' motivation is to reduce their cost by promoting E-learning. But more and more enterprises consider it as an investment plan and require teaching and training services to quantify E-learning in order to prove its achievement and effectiveness. Of course, there are E-learning effectiveness indicators like cost efficiency, learners' satisfaction and learning resources [9]. But because many unsuccessful cases are due to inappropriate financial planification, more and more directors of training services regard cost as the key element of E-learning achievement [11]. The cost-to-benefit ratio and the return of investment ratio are two financial tools that enterprises usually assume to measure the cost-to-benefit ratio [12]. They are also economic indicators proposed by MacRae to evaluate public policies and tools chosen by Kirkpatrick to quantify teaching or training achievements. In this research, we seek a good method to calculate the cost-to-benefit ratio and the return on investment ratio.

The cost-to-benefit ratio is obtained by quantifying the total benefit and cost implicated in teaching and training. Then the ratio divides quantified benefit with quantified cost. The ROI is obtained by subtracting the cost from the total benefit. Then the ROI divides the obtained net benefit with the cost multiplied by the number 100[9]. They are formulated as follows:

$$CBR = \text{program benefits} / \text{program costs}$$

$$ROI (\%) = \text{Net program benefits} / \text{program costs} \times 100$$

#### F. Cost Structure of E-learning Websites

If we want to calculate CBR and ROI, we should above all know the full costing implicated in E-learning. And if we want to calculate the full cost, we would better make an analysis founded on the plan's lifespan [13]. The lifespan of an E-learning website can be distributed into five phases, namely capital investment, teaching material elaboration, advertisement, promotion, teaching research, and administrative service. Capital investment mainly implicates hard and software infrastructure, construction cost, and staff cost. Hardware includes server, networked storage appliance and load balancer. Software includes operation system, server system, media server system, data system, LMS, courseware tool license and frequency band rent. Teaching material elaboration needs hardwares like photographic appliance, non-linear montage apparatus, and image picking apparatus, scanner, microphone system and monitor while the relative softwares are also required for montage, multimedia production and cartoon fabrication. And the production staff cost should also be taken into account.

The research is not done for free either. Hourly work, communication, teaching materials, place, and staff (administrators and assistants) all absorb a lot of cost. Promotion cost is mainly generated by advertisements, publicity prints, publicity activities, etc. The administration cost is generated by water and electricity consumption, office maintenance and office equipment, etc. But soft-hardware infrastructure is a part of capital investment and server's frequency band can be shared by other programs. So what are taken into the teaching and training cost calculation are only items like teaching material production, promotion, teaching and service

#### G. Benefit Analysis of E-learning Websites

Quantification of teaching and training benefit is always one of the challenges that human resources experts and scholars should face. Horton distributes the benefit into three classes: hard benefits, soft Benefits, and fuzzy benefits. Hard benefits are principally things like visible expenditure reduction, production increase, time decrease or quality melioration, which are easy to be quantified in money and immediately related to teaching and training. In general, soft benefits can be quantified only in indirect ways and this class covers performance, innovation, new conception, work environment amelioration, and employees' proficiency. Fuzzy benefits are intangible factors difficult to quantify such as satisfaction, cohesion, directorship's charisma, staff's service attitude and quality [8].

### III. INTRODUCTION TO CASE

CASE was opened in March 2002. Its objectives are as follows: (1) Establishment of software and hardware (websites, teaching materials) for E-learning; (2) Elaboration of digital cultural teaching materials; (3) Supply and transfer of cultural knowledge; (4) Increase in cultural population; (5) Formation of cultural bodies and virtual communities. The following tasks need to be accomplished.



Fig. 4 Platform/System of case

#### A. Construction of a Teaching Platform/System

This platform is a Learning Management System (LMS). It has the following functions: (1) Teaching management including contents of courses, teaching data, collection of homework, experience sharing, result management and announcement; (2) Course management including contents of courses, management of teaching materials, announcement, questionnaire and management of teachers and students; (3) Functions concerning teaching staff like "the same teacher"



function, “new course” function and “new comer” function, which is an assistance to E-learning activities and can improve teaching and learning efficiency, as shown in Figure 4.

### B. Programming of Digital Teaching Contents

The “Basic and Advanced Courses on Community Culture” of the first and the second sessions attracted 110 000 visitors or so, among whom over 2,600 were enrolled. This marked the first step forward in the course of digital learning promotion. Sustainable development in other cultural areas is also expected. And the objective, so to speak, enhancing the general cultural and artistic quality of the nation, will be at last attained.

The courses on “Cultural Creative Industry” of the third session were very popular. The promotion of cultural creative industries is an important part of “Challenge 2008-Council for Economic Planning and Development Plan” of the Executive Yuan. Its goal is to propose an integrated system which may cater to different cultural or artistic industries in fields like staff training, research & development, information integration, financial aid, space supply, industry and university cooperation interface, marketing & promotion and tax exemption. Through E-learning, talents of the whole nation in creative industries can gather themselves together and push those cu local and central authorities. The courses attracted 165,000 visitors and the number of the enrollees amounted to over 2,600.

The fourth session covered such units as “What Is the Culture of Taiwan”, “Features of the Culture of Taiwan”, “Taiwan’s Repository of Cultural Heritage” “Beauty of Taiwan’s Traditional Arts”, “Ecologic Beauty of Taiwan,” and “Community Culture in Taiwan”. Through the courses, the students know better the culture of Taiwan and its future orientation. The knowledge about our cultural heritage has also aroused their thought. The success of this session proved that of the others. 600,000 visitors browsed our site with over 20,000 enrolled.



Fig. 5 Webpage of the CASE

### C. A/V Multimedia and Electronic Journal

This allows CASE to become a teaching website with three dimensional functions. In addition to video streaming (VOD) courses, there are CASE TV units. Every week, campus headlines, key points of the courses and local news are produced and published, as shown in Figure 5. Numerous photos of the community are also taken and sent to the students. Those are part of the efforts exerted to make CASE

not only a learning website but also a lieu of communication and exchange within a community.

### D. Blended Teaching

CASE has its special teaching mode, which is blended teaching or in other words blended learning. That means online teaching and actual face-to-face activities like opening ceremony and completion ceremony and community meetings are blended. Face-to-face teaching (community craft for example) and online communication (bbs, instant message, voting, etc.) are also blended together. The flexible teaching mode permits a multiple way of displaying and sharing knowledge, information, and experience. Both explicit and tacit knowledge can be efficaciously managed by teachers and optimally absorbed by students.

CASE has organized four sessions of courses. Its blended teaching, on the one hand, resorts to the network and on the other hand is dependent on actual study, actual lectures, actual studios, and actual visits. The actual and the virtual are well blended: students can get a better feeling for the context. The mixture of culture and technology makes art and culture more contagious.

### E. Criterion for Course Completion

All the students of CASE cannot get their certificates of completion. Here are the criteria for completion: first, for each subject, no less than eighteen visits must be affected; second, for each subject no less than two comments or two answers should be published on BBS; third, homework must be done and turned in once a subject at least; fourth, questionnaires must be turned in; and last, report on learning experience with CASE must be turned in.

## IV. BENEFIT EVALUATION OF CULTURAL AFFAIRS SCHOOL OF E-LEARNING

In the present research, we try to avail ourself of MacRae's policy indicators, Kirkpatrick's four-level evaluation pattern, and the ROI tool to analyze the effectiveness of *Cultural Affairs, School of E-learning*. The following figure shows us an integrated seven-item evaluation frame, which may serve as a reference to the future E-learning website appraisal.

The analysis is based on the balance report of *Cultural Affairs, School of E-learning*, on the satisfaction inquiry and on the log statistics. For the first session, the number of the enrollees was 1,419 and for the second, it was 1,225. The students' sex, age, residence and education level are demonstrated as follows in the Table 1. We have also referred to Taiwan's internet use record in the year 2002 kept by the national portal net [www.yam.com](http://www.yam.com), in order to make a user distribution comparison.

### A. Equity Criterion Reached by Cultural Affairs, School of E-learning

Students of *Cultural Affairs, School of E-learning* come from 21 cities and counties, offshore isles included, and there are also oversea students. The students are also of different education levels and ages. These data indicate that the *Cultural Affairs, School of E-learning* has reached the equity criterion, one of MacRae's policy indicators. It is a criterion difficult for traditional teaching and training organizations to attain. And three points deserve more concern: there are more female students than male students; the students are mostly aging from 31 to 40 years, but students aging 41-50 years also

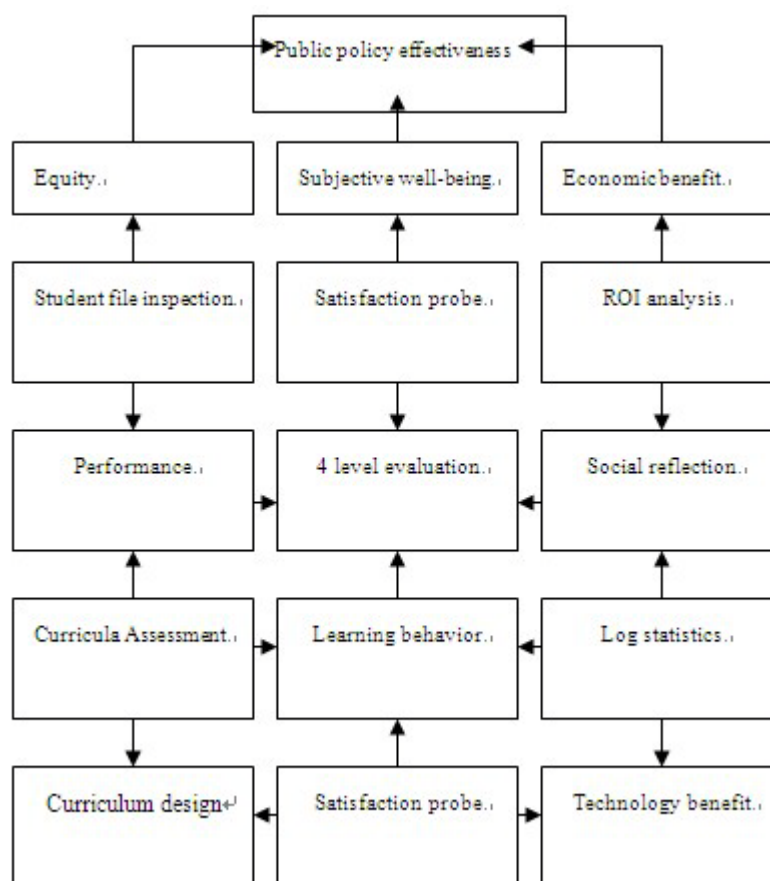


Fig. 6 Integrated benefit evaluation frame for governmental e-learning website

occupy a large proportion, which means that the E-learning population and the internet using population are the same group; students who have at least a master's degree occupy a high proportion, which is a good signal of the country's innovational potential.

#### B. Satisfaction with the Cultural Affairs, School of E-learning

The subjective well-being can be measured on the basis of the students' satisfaction probe. The satisfaction probe is made in the form of questionnaires distributed to the enrollees. The questionnaires should contain items on: curricula, platform operation, educational administration, and tutorship, website's typography, E-journal and general satisfaction extent. The items are to be detailed as follows: (1) curricula which includes teachers, course design, course content, supplementary material, and related general satisfaction extent; (2) platform operation which includes visual design, functional mechanism, operation facility, and related general satisfaction extent; (3) educational administration and tutorship which includes online teachers, web chief, service for clients(phone, email, etc.), and related general satisfaction extend; (4) website typography which includes visual design, content, activities, interaction, and related general satisfaction extent; (5) e-journal which includes typography, content compilation, and related general satisfaction extent; (6) final general extent of satisfaction with CASE. The result is as follows(Table 2)

The above figure shows that most students are satisfied with CASE and that the general satisfaction degree is over 90%. We can deduce that people can accept the pattern of E-learning. The probe is not reproachless because we have no

means to get acquainted with the advice of those who did not receive the questionnaires. Hence in the future we should also take into account the proportion of tested students and that of the non-tested. Another phenomenon that attracts our attention is that the general satisfaction degree is higher than that of any individual one, which shows that one of the advantages of the school of E-learning lies in the synergy of its components.

#### C. The Quantification Indicators of CASE

The net economic benefit of E-learning is usually appraised on the ground of the output, the ROI, and employees' individual performance. However, culture and art dominate CASE's teaching and training. Learning effectiveness in the cultural and artistic area is difficult to quantify because that: first, students' post learning performance is not the indicator of the learning effectiveness in this field; second, in general, the curricula concerns thinking and conception construction, which is not suitable for appraisal through a simple examination system; third, CASE is a governmental but not commercial organization and most of the students are also from non-commercial organizations, so the real-valued benefit is hard to measure. On the basis of Kirkpatrick's pattern and Horton's spectrum, we try to propose the following evaluation items and quantification indicators (as shown in Table 3):

The correlation of different columns in Figure 3 is just one of the hypotheses we put forward at the end of the present research and it needs to be justified to be the basis of the coming research. The correlation is not absolute but relative. For website designers, the emphasis is laid upon the typography or the visual aspect of the page and attention is

paid to visitors' sensation or page's playfulness while the ease of use of the system platform counts mostly to programmers. However, that does not mean that between designers of different domains there is no interaction or exchange. Simon Lu, on the ground of Technology Acceptance Model, found that a learner's cognition and attitude reflects real time and frequency of his platform use. On the subject learning effectiveness, Kirkpatrick's evaluation pattern resorts mainly to test, examination, or practical operation. Yet since E-learning is in principle a system assumed to promote education to the whole society, it is unrealistic to implement

an online impartial examination system. Today the constructivism of interactive discussion dominates the E-learning pedagogy and accordingly we adopt the number of times of discussions as our evaluation indicator. At last, after a comprehensive calculation and balance of the items of the above figures, we can get the last quantification. What remain to be done in the future research are the establishment of their mutual relationship and the determination of their relative response value.

On the ground of the Table 3, we try to build the quantification data of CASE as follows in Table 4:

TABLE 1 STUDENTS STATISTICS, CULTURAL AFFAIRS, SCHOOL OF E-LEARNING

	1st session	2sd session	Internet use of 2002(source from www.yam.com)	Remark
Valid data	1419students	1225students		
Sex proportion				
M	42%	39%	49.6%	
F	58%	61%	50.4%	
Age				
Below 25 years	12%	19%	40.4%	In 2002 internet user age is below 24(included)
Between 26-30 years	19%	23%	26.2%	In 2002 internet user age is 25-29
Between 31-40years	27%	31%	25.6%	In 2002 internet user age is 30-39
Between 41-50 years	19%	17%	6.2%	In 2002 internet user age is 40-49
Over51 years	5%	7%	1.6%	2002 internet user age is over 50(included)
Nil	19%	3%		
Region				
Ilan-Keelung	3%	2.77%	2.95%	Ilan and Keelung included
Taipei City -Taipei County	40%	44.79%	40.9%	Taipei City and Taipei County included
Taoyuan-Hsinchu-Miaoli	12%	7.97%	14.1%	Taoyuan City and County included, Hsinchu City and County included, Miaoli County included
Taichung-Changhua	15%	16.28%	15.4%	Including Taichung City and County, Changhua County and Nantou County
Yunlin-Chiayi-Tainan	11%	10.10%	10.2%	Including Tainan City and County,Chiayi County and Yunlin County
Pingtung-Kaohsiung	13%	9.61%	13.0%	Kaohsiung City and County included, Pingtung County included
Hualien-Taitung	3%	3.09%	1.9%	Hualien County and Taitung County included
Offshore isles	1%	1.22%	0.4%	Including Chinmen County, Lienchiang County and Penghu County
Other regions		0.81%		Other countries
Nil		3.34%		
Education				
Below senior high school and vocational school (included)	7%	8%	21%	
Junior college and university	76%	70%	69.3%	Junior college included
Postgraduate school	16%	19%	9.7%	
Nil		3%		

TABLE 2 STUDENTS' SATISFACTION WITH CASE

	Very satisfied	Satisfied	Indifferent	Unsatisfied	Very unsatisfied
With CASE	24	67	9	0	0
With educational administration and tutorship	23	64	12	1	0
With website design	17	63	18	0	1
With curricula	16	73	9	0	1
With E-journal	16	60	24	0	0
With platform operation	11	61	24	5	0

Valid questionnaires: 89 copies

TABLE 3 GOVERNMENTAL E-LEARNING WEBSITE EVALUATION INDICATORS

Kirkpatrick's four-level pattern	Participants	Horton's spectrum	Objective indicators	Subjective indicators
Reaction	Designers	Curriculum components	Online time of the components	Satisfaction with the website design
		Platform operation	Frequency of (the teaching material) utilization	Satisfaction with the platform
Learning	Teachers	Course content	Number of entries in the course	Satisfaction with the curricula
		Teaching and tutorshop	Number of academic discussions	Satisfaction with teachers
Performance	Managers	Specific plan	Enrollee population(person-time)	General satisfaction
		Specific organization	Number of completers (person-time)	Students' performance result
Results	Policy makers	Specific domain	ROI	Merits and favorable mentions
		Social status	Volume of flow of the website	Fame

TABLE 4 EVALUATION INDICATORS OF CASE

Sessions	1st			2nd			Remark
Items	Number of times	Average A	Average B	Number of times	Average A	Average B	<i>Average A</i> is number of times/number of disciplines <i>Average B</i> is number of times/Completers  4 disciplines for 1st session 、 8 disciplines for 2 <sup>nd</sup> session
		Round	Round		Round	Round	
Number of times of teaching material download	13,889	3472	53	11,643	1455	29	What we call download here concerns only supplementary teaching materials.
Number of entries in the courses	Nil	Nil	Nil	41,018	5127	103	Each login as an entry in course
Number of discussions	4,173	1043	16	7,635	955	19	Discussion means messages left on the BBS.
Number of students	1,419	355		1,228	154		Only enrollment and entry in course can justify status of student
Number of enrollments (person-time)	5,676	1,419		7,535	942		One student can be enrolled for several disciplines at one time.
Number of completers (person-time)	262	66		405	51		The calculating unit is person-time.
Completion rate(person-time)	0.05	0.05		0.05	0.05		Students should who comply with the criterion for completion.
Volume of flow of the website (Number of visits (person-time))	60,000+			110,000			The visit of the homepage is counted as a person-time.

The Table 4 tells us that a standard learning management system supplies us with a standard daily record and statistics, which will be very helpful to the evaluating work. But the data above mentioned are not complete yet. Between the population of enrollments and the population of completers there are differences originated in the course of management strategy. Altogether, it is difficult to make a reasonable comparison at present. However, the publicity effect is not bad. For each session, there were always more than a thousand applications. And the balance of CASE indicates that since its opening (between the period 15 march 2002 and 16 march 2003), its website volume of flow broke through 190,000 person-times. 235 of the students of the first session renewed their application and continued their learning. Two

interesting phenomena interest us. The percentage of the population who completed their learning was relatively low: only a percent. That was evidently related to the nature of CASE as a social education organization, which is usually not exigent with its students. But the increase of participation and completion rate requires innovative teaching strategy and course design too. In the second session the volume of flow was elevated, which shows that the accumulative effectiveness of E-learning is greater than that of traditional teaching.

#### D. Positive Reaction of CASE's Students

During the sessions, an association of fellow students from seven regions was launched. With the initiation of the



TABLE 5 ROI OF CASE

	Total budget (NT)	Number of enrollees (person)	Population Of completers (person)	Per capita teaching cost (A)	Per capita teaching cost (B)	ROI (A)	ROI (B)
1st session of E-learning	1,996,000	1,419	262	1,407	7,618		
2 <sup>nd</sup> session	1,858,800	1,228	405	1,514	4,590		
Average of E-learning School				1,461	6,104	535%	128%
Traditional teaching and training (A)	2,016,300	200	200	10,082	10,082		
Traditional teaching and training (B)	720,000	130	130	5,538	5,538		
Average of traditional training				7,810	7,810		

\* Traditional teaching and training (A) To take the Budget for "WebPages Elaboration Class for Cultural Functionaries" of Cultural Affairs Council of 2000 for reference  
 Traditional teaching and training (B) To take the Budget for "Class for Cultural and Artistic Administrators" of Cultural Affairs Council of 2003 for reference

- \* Per capita teaching cost (A)= Total budget /Number of students to admit
- \* Per capita teaching cost (B)= Total budget / population of completers (person-time)
- \* ROI Cost (A)=Average of E-learning School (A)/Average of traditional training (A)
- \* ROI Cost (B)= Average of E-learning School (B)/Average of traditional training (B)

enterprise strategy studio, seminars on community building were organized and related knowledge obtained from CASE resulted in five practical programs for community building. Another example was the documentary about Ouches. The idea came from the BBS of CASE. The problem of offshore isles was once the focus of discussion in CASE's online forum. Ouchiu was a very typical example of this kind of problem. Then the local people and CASE's community collected films and files on the isle. An exhibition was also organized for this. All those are things that cannot be quantified and appraised in money.

### E. ROI of CASE

In the end, we treat the ROI evaluation. Before the opening of E-learning schools, teaching and training was a relatively concrete activity that requires students of different cities or counties to come to a given place to study. To students, travel and the lodgment are extremely expensive and cost of the training organization is also very high. But to Rosenberg, what E-learning spares students is not simply the travel or the lodgment expenses but the opportunity cost [3]. For traditional teaching as well as for E-learning, cost calculation, including the opportunity cost calculation makes a difference only in some individual cases. And in non-commercial public services, the comparison is even more difficult to draw [14]. Consequently, in the present research, as the basic principle of ROI and cost-to-benefit evaluation, we prefer the analysis of the per- capita learning cost to the traditional theory, namely, that regards cost as a benefit indicator, as shown in Table 5.

In the budgets of the first and second sessions of CASE, no equipment expense was involved and all the costs were related to staff, service, and administration. In this respect, a comparison can be drawn between it and traditional training. From Figure 7, we can deduce the difficulty in proving that the ROI of E-learning is evidently larger than that of traditional training. Because though the difference in education is large and training cost, actual or virtual, is accordingly determined by nature of curricula, teaching

objective and hour. So Rosenberg was right in saying that the decisive motivation of E-learning consists in sparing time and not in sparing money. The teaching materials of E-learning can be repeatedly used and the transmission time and cycle may be shortened. That is also what traditional training can in no case realize.

Fig. 7 curriculum schedule of case

### V. CONCLUSION

In the present research, we have taken CASE to treat upon the problem of governmental E-learning website effectiveness evaluation and we find that E-learning can help improve the equity related to resource distribution and reduce disparity between towns and country. People are also satisfied with E-learning experience. Economically, E-learning does not cost more than traditional training and if we take into account elements like time cost, opportunity cost, teaching material recycle and policy publicity, E-learning takes on more advantages. But on the subject of planning, we have neither common standard nor standard statistics on system platform, courseware design, teaching material presentation, and

teaching appraisal, which makes it arduous to confront different plans, different course wares, and different components. Even subjective evaluation indices have much to be desired. The SCORM (Sharable Content Object Reference Model) promoted by government is good for both courseware exchange and regulation on evaluation indices. The policy-making support system may be further established.

In a school of E-learning that fails actual control that characterizes traditional training to raise completion rate, some work needs to be done on didactics, pedagogic strategy, teaching material design and evaluation mode. We have also found that in E-learning there are some zealots. The epithet is not pejorative and the phenomena should be a part of our future research program. CASE's teaching and training cover a considerable variety of activities: media flow, dynamic briefs, supplementary teaching materials, interactive discussions, instant messenger (icq), E-journal, campus headline, and CASE TV. However, statistical insufficiency impedes an exact evaluation of its benefit. Students' satisfaction extent probe signifies synergetic effectiveness of different components, which is yet to be studied.

To conclude, we affirm CASE's positive effect upon the promotion of cultural policies and the building of internet culture, because most of CASE's students of the first and second sessions were adults from society. Their zeal was corroborated by the number of enrollees, the volume of flow, the number of discussions, etc. For the present phase, the governmental E-learning website is a subprogram of the National Science and Technology Program for E-learning. In this respect, CASE contributes to technology diffusion.

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